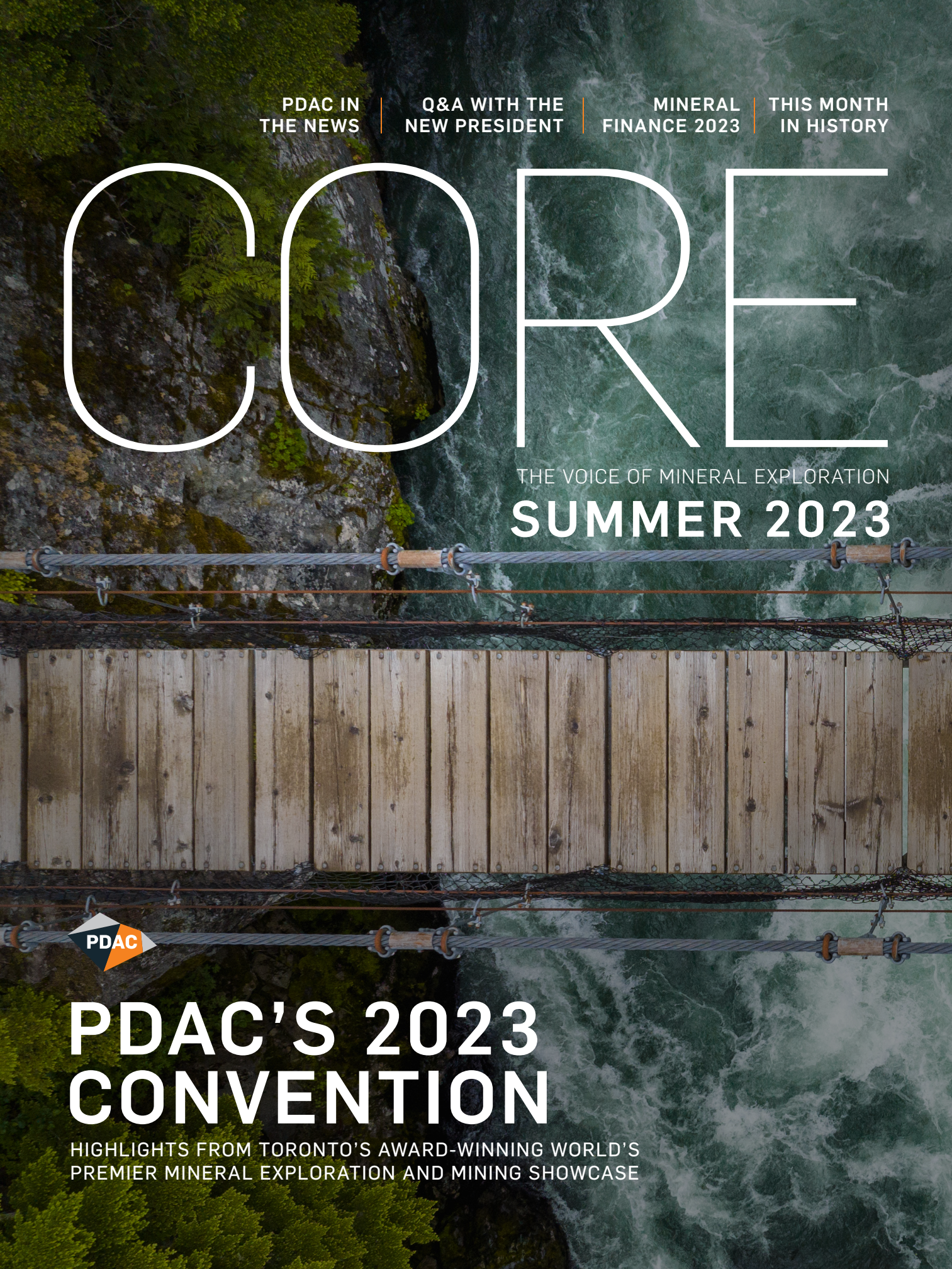
PDAC IN THE NEWS | Q&A WITH THE NEW PRESIDENT | MINERAL FINANCE 2023 | THIS MONTH IN HISTORY

CORE

THE VOICE OF MINERAL EXPLORATION

SUMMER 2023



PDAC'S 2023 CONVENTION

HIGHLIGHTS FROM TORONTO'S AWARD-WINNING WORLD'S PREMIER MINERAL EXPLORATION AND MINING SHOWCASE

CORE is produced by staff primarily located in Toronto, Ontario, on the traditional territory of the Mississaugas of the Credit First Nation, the Haudenosaunee, the Wendat, also known as the Huron, the Chippewa, the Anishnabeg and all other Indigenous nations that have lived on these sacred lands since time immemorial.

As the voice of mineral exploration and development in Canada, PDAC is committed to reconciliation through respectful dialogue and the creation of meaningful and mutually-beneficial partnerships between First Nations, Inuit and Métis communities and industry.

We respect that as an industry that operates the world over, we engage with organizations and individuals far beyond these lands, and wish to acknowledge all Indigenous lands and peoples across the world, wherever you are reading this from and call home.

CORE

SUMMER 2023

PRODUCED & PUBLISHED BY
PDAC's Communications Dept.

800-170 University Avenue
Toronto, Ontario
M5H 3B3 Canada
416.362.1969

PUBLICATIONS EDITOR
& DESIGNER
Andy Stanleigh

PUBLICATION DATE
July 13, 2023

PHOTO CREDITS
PDAC Archives
Used with permission

CONTRIBUTORS
Scott Barber
Lynn Bodwell
Jahan Hussain
Jeff Killeen
Florence MacLeod
Ran Maoz
Krishana Michaud

COPYRIGHT
©2023 PDAC
All rights reserved

FOLLOW PDAC
the_PDAC
thePDAC
thePDAC
PDAC_official
ThePDAC

VISIT US ONLINE
pdac.ca

CONTENT & FEATURES

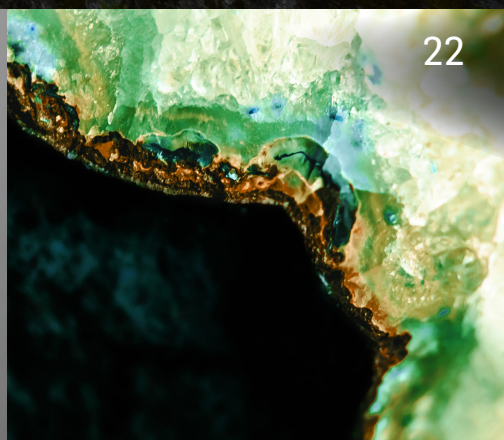
4 **PDAC IN THE NEWS**
Key milestones, updates and PDAC-related news, including events and accomplishments of the association.

8 **Q&A WITH RAYMOND GOLDIE**
An informative profile on PDAC's newest president, including where and when his career in the industry first began.

10 **2023 CONVENTION HIGHLIGHTS**
Highlights from this year's industry showcase in Toronto, including the first ever Dr. Donald M. Leishman Student Convention Experience.

22 **MINERAL FINANCE 2022**
An in-depth examination of the 2022 minerals and exploration financial market, including data, graphs and insights.

26 **THIS MONTH IN HISTORY**
140 years ago, a blacksmith in Sudbury made a chance discovery that changed the Ontario landscape, and made Canada an industry leader.



PDAC IN THE NEWS

SUMMER 2023

SUPPORTING THE SECOND ANNUAL INTERNATIONAL DAY OF WOMEN IN MINING

On June 15, 2022, International Women in Mining successfully launched the first-ever International Day of Women in Mining (IDWIM), with PDAC as a proud campaign supporter.

With the inaugural 2022 launch overlapping PDAC's Convention that year, the association took the opportunity to share the IDWIM campaign with our members across social platforms, in publications and newsletters, and invited industry professionals and the media at large to the day's virtual event. The launch included a two-hour widely attended online celebration, and became an international topic of discussion across many media platforms.

For 2023's IDWIM, PDAC once again shared and supported the campaign, which was live-streamed on YouTube on June 15 with keynote speakers, interactive activities and prizes. IDWIM encourages the mining community to acknowledge and celebrate the contributions of women in the industry, as well as pledge to continue working together towards gender equality in the sector.

PDAC CO-HOSTS THE MINERAL OUTLOOK DIALOGUE IN OTTAWA

Together with Natural Resources Canada and The Mining Association of Canada, PDAC presented the annual Mineral Outlook Dialogue in Ottawa. This year's event took place between Monday, May 8 and Friday, May 12. PDAC's new president Raymond Goldie kicked off the dialogue with opening remarks made to an enthusiastic crowd, who were also celebrating National Mining week in Canada.

During the week, a series of virtual presentations and in-person seminars addressed the future of the mineral exploration sector. Sessions included topical subjects such as sustainability, responsible exploration, and building an inclusive economy that can benefit all Canadians. As well, Jeff Killeen, PDAC's Director, Policy and Programs, engaged attendees with a presentation on the upcoming Land Disturbance Study, co-developed with the Mining Association of Canada.

PDAC's Policy team also took the opportunity to communicate directly with government representatives on a host of issues currently facing the industry. Most notably, this included the importance – and future potential of – critical minerals in Canada.

CORE MAGAZINE WINS TWO AWARDS

The leading voice of the mineral exploration and development community was honoured this spring by PR NEWS with two Nonprofit awards in the Communications & Campaigns category. *CORE* magazine's summer 2022 issue received the top award for "Annual Publication or Brochure", and the award for "External Publication or Report."

The summer issue was recognized for the efforts of PDAC's Communications team to create an AODA (Accessible Ontarians Disability Act) compliant digital experience, which also adheres to WCAG 2.0 (Web Content Accessibility Guide) standards for readers who use assistive reading devices.

This was also the first issue produced in-house at PDAC. It represents work from Indigenous Affairs committee members, the Convention team, Communications, Membership, Students and individuals with expertise in their respective roles – all bringing together content that reached the most audience members and earned a higher open rate than previous *CORE* summer issues.

Congratulations to everyone at PDAC who contributed, and on behalf the association, we greatly thank PR NEWS for the awards.

PDAC SUBMITS LEGISLATIVE & REGULATORY CONCERNS TO FEDERAL GOVERNMENT

In May of this year, PDAC provided commentary to the House of Commons' standing committee on Industry, Science and Technology, to raise concerns and offer recommendations regarding proposed amendments to the Investment Canada Act (Bill C-34). Part of the amendments address foreign investments in the exploration, extraction and processing of critical minerals in Canada. The changes could limit access to international investments for Canadian companies, which may lead to less transparency and increased uncertainty in the Canadian marketplace.

Also in May, the Ministry of Transportation launched a one-month consultation period on amendments to Canada Aviation Regulations (made in December 2022) that affect aerial work in mineral exploration, as well as the ability for pilots to respond to evacuations or emergencies in a timely manner. PDAC's submission seeks, among several things, clarifications and an expanded definition of "aerial work" that reflects the realities of mineral exploration in remote settings.

PDAC supports members through policy and advocacy work by directly engaging with government ministries and regulatory agencies, responding to public consultations and being a voice for industry to Parliamentarians. To read both submissions by PDAC, click here or visit our Advocacy page at pdac.ca/programs-and-advocacy/programs-and-advocacy/regulatory-affairs.

PDAC IN THE NEWS

SUMMER 2023

S-IMEW SUCCESSFULLY RETURNS TO SUDBURY

The celebrated Student-Industry Mineral Exploration Workshop (S-IMEW) was held once again, after a three-year hiatus due to the pandemic. From May 4-16, 22 geoscience students from across Canada travelled to Sudbury, Ontario – a world-renowned geological and mining region, to get an inside look at the mineral exploration industry. They participated in hands-on field activities, such as geophysical exploration methods with Vale and Abitibi Geophysics, core logging at IAMGOLD's Cote Gold Deposit, geochemical exploration methods with the OGS and GSC, visited a drill site, and went underground at Glencore's Nickel Rim South Mine.

The students also learned about the unique geology of the Sudbury Basin, travelling to the Kirkland Lake, Cobalt and Temagami regions, touring underground gold mines and getting a first hand look at how gold is processed in a mill. In addition to the field component, students participated in presentations on trending industry topics and learned about the variety of industry careers from S-IMEW alumni. Daily networking allowed students to make valuable connections with industry representatives.

To take part in S-IMEW 2024, geoscience students must be nominated by their departments. To learn more, click here or visit pdac.ca/members/students/s-imew.

PDAC HOSTS ITS FIRST MEMBER EVENT AT AME'S 2023 ROUNDUP

Thousands of mineral exploration and development community members gathered in Vancouver, B.C., from January 23-26 for the annual AME Roundup. The conference provides a venue for the industry to meet, collaborate and encourage new exploration. Held at the Vancouver Convention Centre, the theme this year was "Critical to Our Future."

This was the ideal atmosphere for PDAC to host its first "Meet & Mingle" member event of 2023. Over 75 west coast PDAC members were in attendance, coming mostly from British Columbia and Yukon. This outreach event gave attendees an intimate space to network, meet with PDAC directors, and discuss future trends in the industry.

As a long-standing volunteer with AME and PDAC, then-PDAC president Alex Christopher reiterated the importance of membership. The association's programs and advocacy work would not be possible without our members – and as with the overall theme of the AME conference – building relationships is critical for our future.

CANADA'S CRITICAL MINERALS: 101

Critical minerals continue to dominate conversations across the exploration industry. The topic is also generating attention in the mainstream media. However, the general public may not be aware of just vital a role critical minerals play in the transition to a low-carbon future for Canada, and the world.

PDAC has created a web page dedicated to explaining what critical minerals are, where they can be found, how they are used, and why they are important for us today – and for the future. The page is set up in an FAQ-style format, with seven of the most common questions related to the exploration and uses of critical minerals, including how PDAC was involved in developing the Canadian government's new Critical Minerals Exploration Tax Credit (CMETC).

Critical minerals are also major components used in electric vehicles and lithium batteries – key technologies that are leading the race for a low-carbon future. To learn more about them, click here or visit pdac.ca/critical-minerals-101.

Q&A WITH PDAC'S NEW PRESIDENT

PDAC President Raymond Goldie started his two-year term on March 8, 2023. We sat down with Raymond to learn more about his decades of experience in the industry.

Born and raised in New Zealand, Raymond holds a B.Sc. from Victoria University in Wellington, New Zealand, an M.Sc. from McGill University, and received his PhD from Queen's University in Canada. The topic of his doctoral thesis was the geology of the Archean rocks in the Noranda area of Quebec.

You were born, raised, and received your B.Sc. in New Zealand. What brought you to Canada to complete your Masters and PhD?

A redhead.

Was there a specific moment (or people) in your life that inspired you to follow mineral exploration as a career, or have you always had an interest in this space?

In my last year in high school in Wellington, New Zealand, I discovered that my favourite subject was geography. It was also the subject in which I earned my best marks in the year-end, nation-wide exams, which was astonishing because the geography teacher had been on sabbatical that year. In fact, his absence allowed me to pursue a growing interest in the geology of the Wellington area. Although Wellington is blessed with astoundingly boring rocks, its landforms are some of the most interesting on the planet: bold coasts and captured rivers; faults major, minor, reverse and normal; terraces marine and alluvial; grabens, half-grabens and horsts; peneplanes dissected, buried and partially exhumed. Everywhere, the shape of the land told stories. I wanted to learn how to read those stories. After I'd enrolled in geology at university, I learned that I could actually make a living understanding those stories, if I were to work in mineral exploration.

Before becoming PDAC's President, you were First Vice President, a member of the Board of Directors, and active on various PDAC committees over the years. How did you come to volunteer and be so involved with the association?

While at Queen's University I went to my first PDAC Convention, and I was so impressed that I have been to every Convention since. I learned that PDAC is so much more than just a Convention, too, and that it is populated by helpful, friendly people. I wanted to be helpful and friendly as well, so I began to join PDAC committees.

I also chaired a sister organization – the Toronto Geological Discussion Group ("TGDG"). In the 1980s, I ran a TGDG field trip to the burgeoning Hemlo gold deposit. Once I realized that everyone on the trip loved to look at drill core, I came up with the idea that a Core shack might be a popular event at the PDAC Convention – which it proved to be.

You've also held several positions within the industry itself, including field geologist, analyst and economist. If you had to pick, do you have a favourite?

Mining analysis is the best job in the world. It enabled me to visit projects which included a limestone quarry in Southern Ontario, a gold mine in an active geothermal area of Papua New Guinea and a deep nickel-palladium mine in Siberia. I could apply my knowledge of geology and economics to assess the future of each one.

Do you have a favourite region of Canada you've been able to explore? Is there also a place in Canada you never have explored, but would like to?

I was born on Taranaki volcano in New Zealand and one of my delights in exploring the world is visiting volcanoes. The most beautiful volcano I have seen in Canada is Eve Cone: smooth, symmetrical and mantled with golden tephra. Appropriately, it is in the Golden Triangle of British Columbia. I have also stood on land north of the Arctic Circle in Iceland, Sweden, Finland, Russia and the U.S., but never in Canada. I would certainly support any government investment in more infrastructure to make it easier to go to, and around, Arctic Canada!

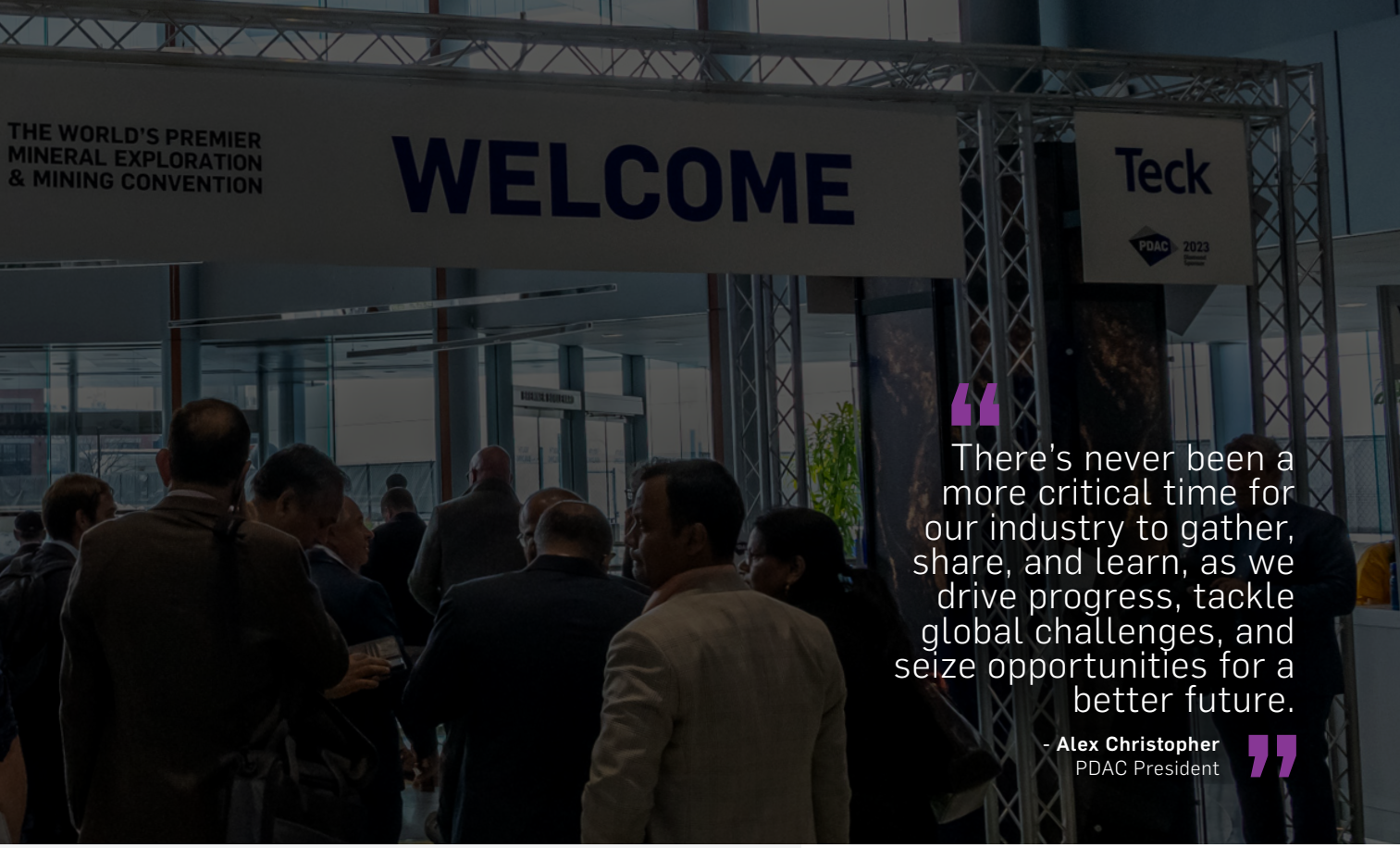
PDAC 2023 CONVENTION

THE FULLY IN-PERSON EVENT IN TORONTO SHOWED THAT THE INDUSTRY IS ONCE AGAIN ENERGETIC, EXPANDING, AND TEEMING WITH OPPORTUNITY

Covering over 600,000 square feet of event space in Toronto – with 23,819 attendees from across the globe – the 2023 Convention was one the largest events in PDAC's 91-year history.

Returning to pre-pandemic levels, PDAC's 2023 Convention was the first fully in-person event in three years, and offered even more of the expected best-in-class professional programming, exhibits, networking and more.

"For almost a century, the PDAC Convention has been recognized as the leading choice for the world's mineral exploration and mining industry, bringing the latest trends, technologies and conversations to one central location – and 2023 is no exception," said Lisa McDonald, PDAC Executive Director.



> There's never been a more critical time for our industry to gather, share, and learn, as we drive progress, tackle global challenges, and seize opportunities for a better future.
>
> **- Alex Christopher**
> PDAC President

The award-winning event in Toronto showcased an exceptional lineup of speakers, governments, companies and leading experts from around the world. PDAC was also proud to deliver the latest in professional development opportunities, as well as seeing governments continue to use the annual event as a platform for important announcements.

Highlights from the 2023 Convention include:

- Industry-leading programming focused on capital markets, Indigenous affairs, students and early career, sustainability and technology.
- Keynote speakers included Ken Hoffman, McKinsey & Company; Sinead Kaufman, Rio Tinto; Richard Inglis, Newmont Corporation and Alex Dorsch and Kevin Frost, Chalice Mining.
- Canadian Natural Resources Minister Jonathan Wilkinson announced an investment of $344 million to help advance "the development of a dynamic and competitive critical minerals sector."
- Five of the industry's top performers were honoured at the PDAC Awards Gala. This prestigious event was once again held at the Fairmont Royal York Hotel, Toronto.
- The final day marked the transition of PDAC presidents. We thank Alex Christopher for his remarkable contributions to the association – and to the industry – during his two-year presidential term, and welcome Raymond Goldie to the role.

Coming from over 130 countries, the 2023 Convention welcomed investors, miners, geoscientists, community leaders, students, government officials and more. The annual showcase once again featured the best business, investment and networking opportunities in the mineral exploration and mining industry.

Thank you to everyone who participated in PDAC 2023, including all of our volunteers, speakers, sponsors, exhibitors and attendees. We look forward to welcoming everyone back for PDAC 2024 from March 3-6, 2024.

The following pages are a collection of photos and stats that showcase the energy and people that made PDAC 2023 a success.

23,819
ATTENDEES

133
COUNTRIES
REPRESENTED

30.4%
INTERNATIONAL
ATTENDEES

Outside of Canada, the largest number of attendees came from the **United States, Australia, the United Kingdom, Chile, Peru, Brazil, Mexico, Argentina, Mongolia, Germany, Ghana and India.**

1,050
TRADE SHOW BOOTHS

604
EXHIBITING ORGANIZATIONS

71
GOVERNMENT EXHIBITORS

909
STUDENT ATTENDEES

487
ACCREDITED MEDIA

37
SPONSORS

499
INVESTORS EXCHANGE BOOTHS

19
PROSPECTOR'S TENT EXHIBITORS

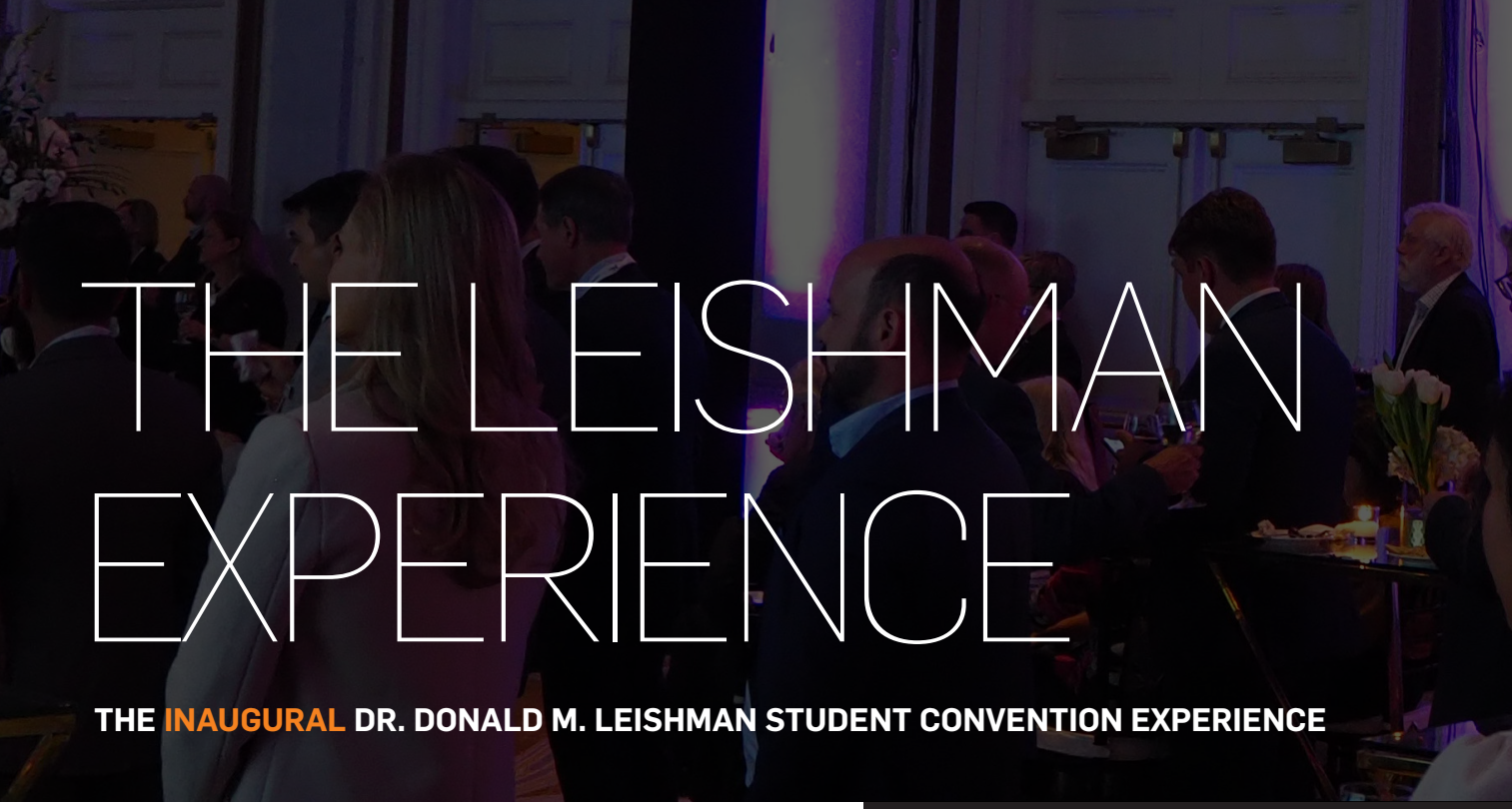
40
CORE SHACK EXHIBITORS

717
SPEAKERS

7
SHORT
COURSES

111
PROGRAMMING
SESSIONS

For more info
and a look ahead
to PDAC 2024,
click here or visit
pdac.ca/convention



THE LEISHMAN EXPERIENCE

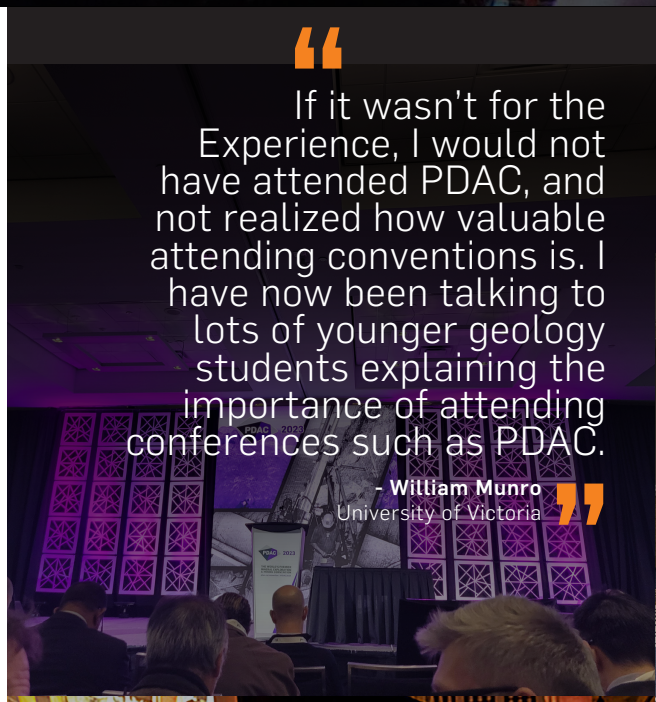
THE INAUGURAL DR. DONALD M. LEISHMAN STUDENT CONVENTION EXPERIENCE

Established with the generous support of the Leishman family, the Experience provides an all-expenses paid opportunity for students to attend the PDAC Convention for the first time ever.

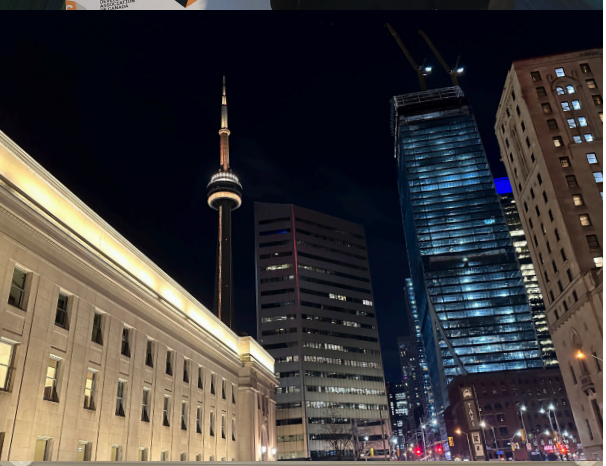
Don Leishman was a family physician with a passion for geology and mining. For decades, Dr. Leishman was an avid attendee of PDAC's Convention, where he made countless friends within the mineral exploration and development industry.

In his honour, the Leishman family wanted to create an opportunity for students to learn about the inner workings of the mineral industry, have access to mentorship opportunities, and make connections on an international level in an effort to expand their networks for advancement in the field.

The five students selected for the 2023 Experience were Aidan Buyers, Saint Mary's University; Irina Malakhova, University of Alberta; Shayna Meinzinger, University of Waterloo; Nicolas Prieto Moreno, Memorial University of Newfoundland and William Munro, University of Victoria.



> "If it wasn't for the Experience, I would not have attended PDAC, and not realized how valuable attending conventions is. I have now been talking to lots of younger geology students explaining the importance of attending conferences such as PDAC."
>
> **- William Munro**
> University of Victoria



These lucky students had their flights, accommodations and meals covered. They also received exclusive access to programs and invitation-only events during the Convention. This included the President's Reception, S-IMEW Alumni Reception and the Awards Gala – where they were able to connect with industry leaders, government representatives, fellow students, and mentors who shared their experiences, enthusiasm and offered guidance.

Aidan Buyers, speaking of his experience, said "We were invited to exclusive dinners and receptions where we got to meet mining legends, journalists, and politicians who were eager to share with us stories from the past, and their hopes for the future."

Touring the exhibit floors with students and introducing them to his mining colleagues was exactly what Dr. Leishman did during his decades of attending PDAC conventions. When asked if they were able to make any solid industry connections during the experience, all five students enthusiastically said yes, with William Munro stating, "I had a lot of people ask me to send them my resume … PDAC helped me make so many connections that I wouldn't have made if I wasn't able to attend." Shayna Meinzinger agreed, stating, "I made plenty of invaluable connections that I will reach out to post-graduation. As a student, attending PDAC's Convention is extremely advantageous for your career in the mining industry."

About the experience as a whole, Nicolas Prieto Moreno summed it up by saying, "We were not only privileged in being able to live this experience to the fullest, and with all the comforts, but we were also lucky to know and share with the Leishman family, some PDAC board of directors, politicians, and professionals from the industry where everyone was very kind, friendly and took it upon themselves to give us advice that will help us not only in our professional life, but also in our daily lives."

When asked if they would recommend other students apply for the Experience, Shayna replied, "I have shared my amazing experience with many of my classmates, who would be crazy not to apply for this rewarding experience! Personally, I am planning to attend the next PDAC convention to make new connections and see what opportunities may present themselves to me in 2024."

To read more about the Experience, and to find out when applications will be open for PDAC 2024, click here or visit pdac.ca/dr-donald-m-leishman-convention-experience.

PARTICIPATE IN PDAC 2024

Are you a qualified individual with expertise in your field? A wide range of opportunities for speakers and facilitators to share knowledge, strategies, new concepts, case studies and more are now available for 2024's Convention.

The following programming areas have opportunities for you:

- Capital Markets Program
- Exploration Insights
- Short Courses
- Technical Program
- Corporate Presentation Forum for Investors
- Indigenous Program
- Sustainability Program
- Presentation & Reception Room Program

Apply today by clicking here or visiting pdac.ca/programming-opportunities.

> The energy and optimism witnessed during PDAC 2023 was palpable – it is clear the mineral exploration and mining industry has entered a period of great transformation and growth.
>
> **- Alex Christopher**
> PDAC President

| Are you a **new** exhibitor?

Applications will open to new exhibitors on Tuesday, September 19 at 10:00 a.m. EST.

Save the date and apply for booth spaces in the popular Investors Exchange, Trade Show, Trade Show North, Core Shack and Prospectors Tent areas. For more information visit pdac.ca/convention/exhibits.

| Are you a **returning** exhibitor?

Renew your Investors Exchange, Trade Show and Trade Show North booth spaces for PDAC 2024.

All returning exhibitors must renew by the priority deadline of August 15, 2023 at 5:00 p.m. EST.

| Sponsorship opportunities are also available now.

Find information about the PDAC Sponsorship & Marketing Program at pdac.ca/convention/sponsors/opportunities.

THANK YOU TO OUR PDAC 2023 CONVENTION

SPONSORS

Teck

PDAC 2023 Diamond Sponsor

PLATINUM SPONSORS

BHP

RioTinto

VALE

MINING COUNTRY SPONSORS

Perú

invest IN CANADA | investir AU CANADA

BRASIL WORLD CLASS EXPLORATION OPPORTUNITIES

PATRON SPONSORS

BMO

CAT

nexa

THE LIND PARTNERS

Mosaic

SOUTH32

TMX THE FUTURE IS YOURS TO SEE.

WHEATON PRECIOUS METALS

PREMIER SPONSORS

Alamos Gold Inc. — Celebrating 20 Years
AngloAmerican
Franco Nevada — The GOLD Investment that WORKS
Newmont
Major Drilling
B2Gold
SLR

GOLD PLUS SPONSORS

Barrick
Destination Toronto
IAMGOLD
ERG
Agnico Eagle
LundinGroup
Freeport-McMoRan
Hudbay
PearTree
Pan American Silver
Jot.
Worley — energy | chemicals | resources
Napier-Reid — Since 1950
SLS Group

SHIFTING SANDS

EXAMINING THE INDUSTRY'S MINERAL FINANCE LANDSCAPE FROM 2021 TO TODAY

The mineral exploration and development sector has faced opposing forces over the last two years.

We have seen the short-term economic outlook decline in Canada and internationally, which has weakened the demand for raw materials. This has constrained the available capital for exploration companies looking to raise funds. Offsetting this, however – in part – are skyrocketing longer-term projections for raw materials, driven mostly by the transition to a low-carbon economy.

In the short term, there is a significant uncertainty creeping into the world's economic and business landscapes. Inflation was the centerpiece of both the markets and Main Street in 2022 – reaching the highest rates seen in decades.

To combat this inflationary wave, central banks around the world increased interest rates, which sparked concerns for global recessions, and a downgrade in GDP growth projections. Figure 1 presents the different estimations and projections by the International Monetary Fund (IMF) for growth in 2022.

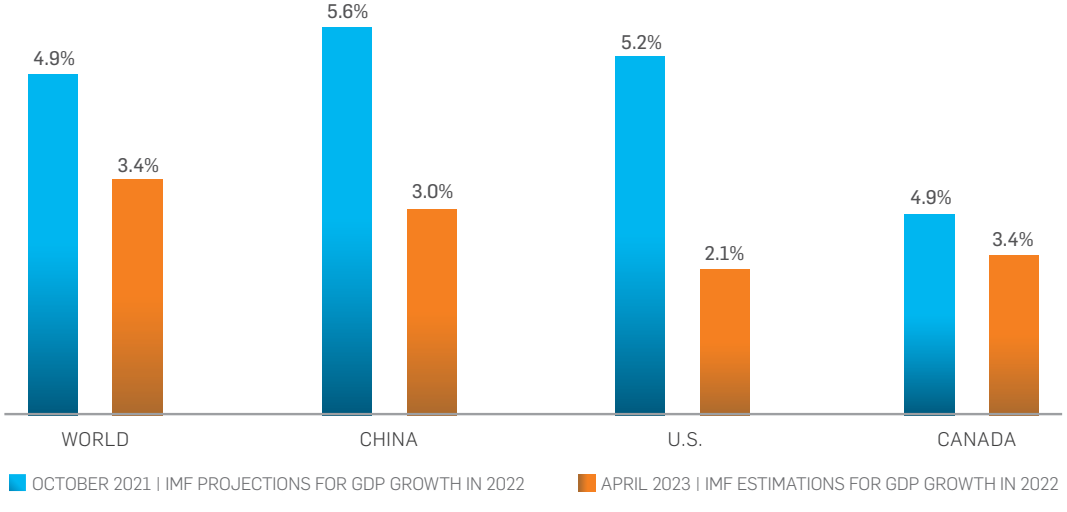


FIGURE 1 | IMF'S FORECASTS AND ESTIMATIONS FOR GROWTH IN 2022

Looking back at October 2021, the IMF was looking to China and the United States to drive a post-pandemic economic recovery, as both countries were projected to be above the global growth curve. Less than two years later, we see these same two countries below the global average, which has translated to a drop in demand for raw materials and in metal pricing, as shown below in **Figure 2**.

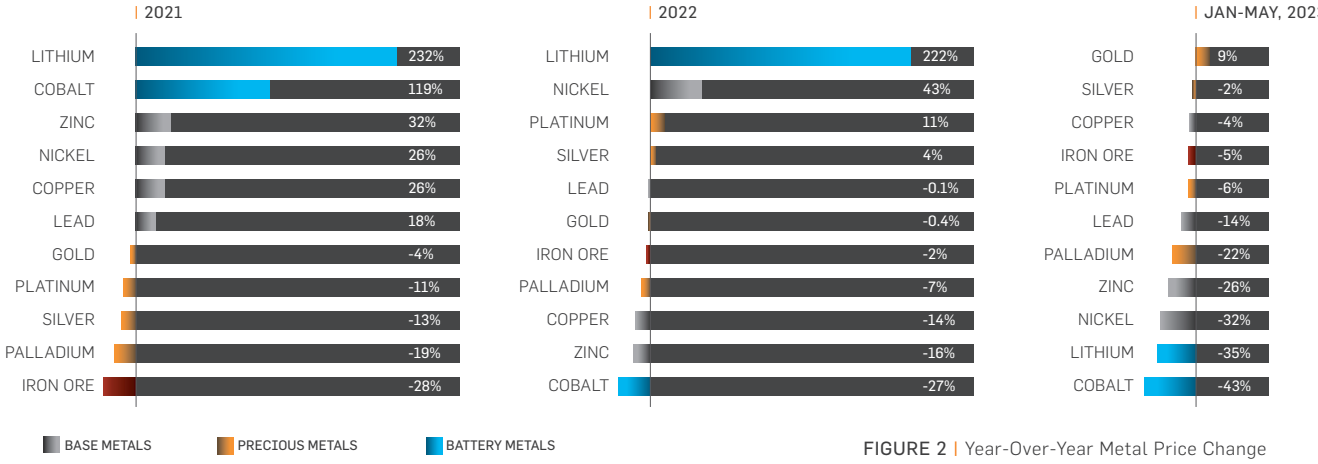


FIGURE 2 | Year-Over-Year Metal Price Change

Base metals performed well in 2021 with double-digit returns year-over-year (YOY), but prices for this group – and most other metals – started to slide in 2022, then worsening in 2023. With the exception of gold, nearly all metal prices have entered negative territory this year, once again showing gold's safe haven characteristics and resilience during times of uncertainty.

After moving largely in-step for many years, cobalt and lithium – the two principal battery metals – had prices head in starkly different directions in 2022. Lithium prices raised multi-fold, while cobalt retreated to negative territory – most likely the result of differing future demand expectations. So far in 2023, however, lithium has joined cobalt in a downward trend, likely being the partial result of additional supply coming into the market.

The global mineral sector was not immune from the changing economic landscape, with a 50% YOY decline in global equity funds raised in 2022, as **Figure 3** indicates. A more moderate slowdown in domestic financing increased Canada's share of global equity fundraising to nearly 30% – well above its 10-year average of 22%.

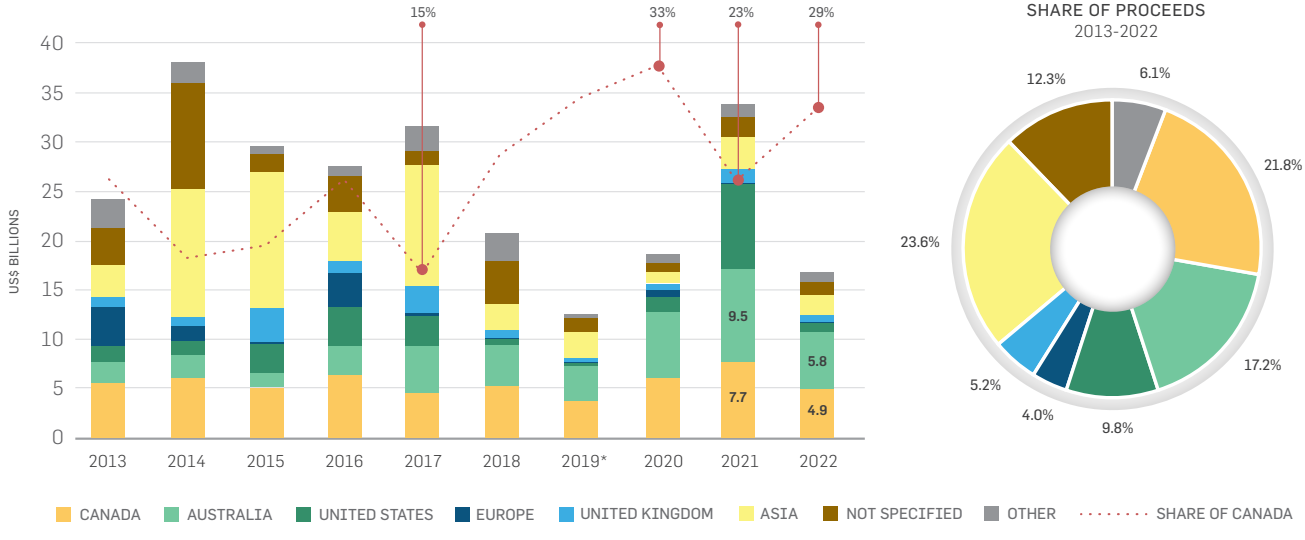


FIGURE 3 | Global Equity Financing by Region

*2019 DATA EXCLUDE A GLENCORE-KATANGA EQUITY DEAL OF C$7.7 BILLION

Canadian stock exchanges achieved a relative outperformance in 2022. This can be primarily attributed to the capacity of Canada's financial services ecosystem to connect investors to the mineral industry, and to the positive effect of targeted mineral exploration incentives for investors. This includes, among other line items, the new Critical Minerals Exploration Tax Credit (CMETC) and the flow-through share system.

As **Figure 4** highlights, 2022 showed a decade high in global exploration spending, despite weak metal prices and market activity. We commonly see this effect, however, as companies typically spend exploration and development funds over the 12-18 months after raising new capital. So the peak we see in 2022 links back to the much more robust financing environment of 2021. This effect also gives us a hint that global exploration activity is likely to decline in 2023.

The recent increase in Canada's share of the exploration spending is quite notable, and accounted for 20% of all global exploration activity over the last two years, which is well above Canada's 10-year average of 15%.

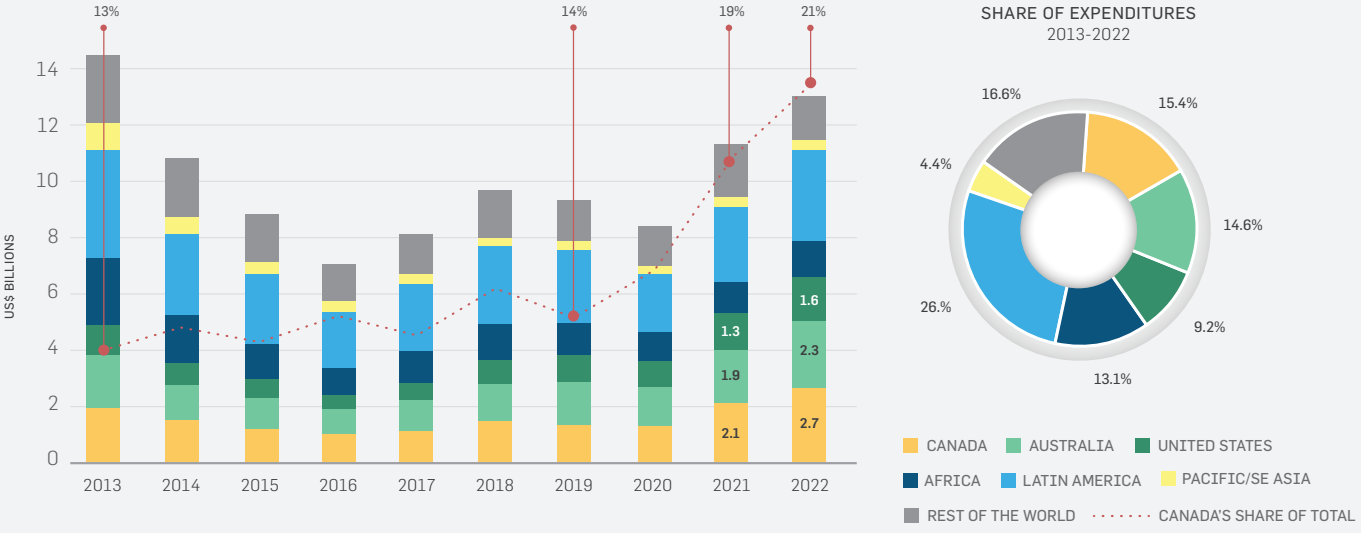


FIGURE 4 | Global Exploration Spending by Region

A longer term picture of the low-carbon economy and transition minerals

While short-term macroeconomic conditions have created headwinds for most metal prices and limited financing options, the importance of minerals to the transition to a low-carbon economy is getting wider recognition. Outside of current metal or commodity prices, we are seeing impacts from this growing awareness translate into new incentives for exploration, as well as for production and processing of key critical minerals, including copper, lithium, cobalt, nickel, graphite and rare earth elements (REEs).

As an example, we see the price of lithium influenced by competing short and long-term forces, as this EV-battery metal topped all others in both 2021 and 2022. However, as **Figure 5** shows, while the price of lithium increased by more than ten-fold in 2021 and 2022, global production responded to this price spike by increasing up to 60% between 2020 and 2022. It is likely that a number of marginal lithium projects have come online with higher pricing, which has helped to rebalance the short-term supply/demand outlook, deflating the lithium price through early 2023. With that said, the long-term expectations that lithium demand will climb with greater electric vehicle production seems intact, and the metal's price has begun to rebound in May and June of this year.

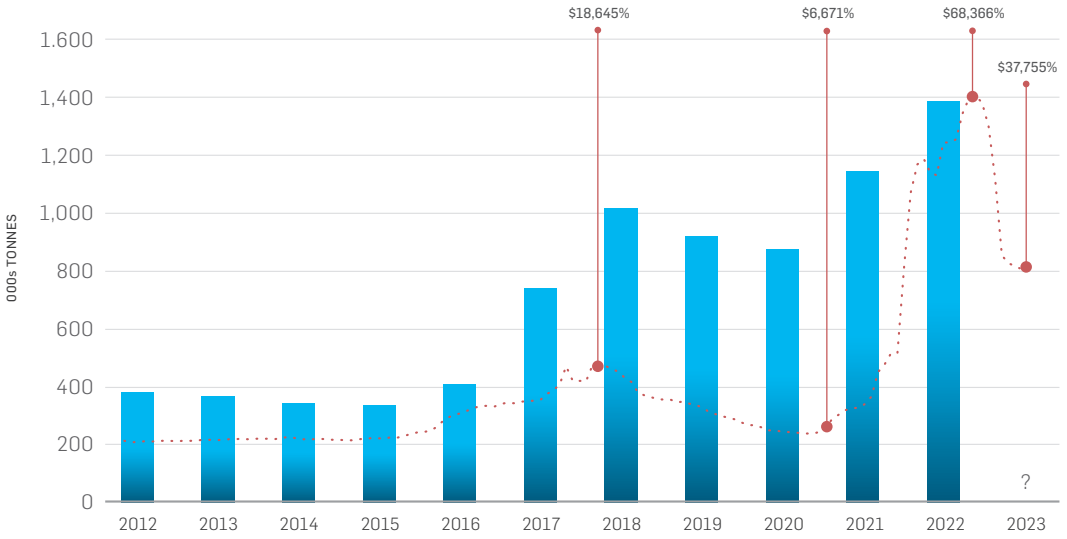


FIGURE 5 | Lithium Price and Global Production

LCE PRODUCTION (000s TONNES)

LITHIUM CARBONATE PRICE ($/t)

A skyrocketing lithium price and launch of government incentives – such as the Critical Mineral Exploration Tax Credit (CMETC) in Canada and the Inflation Reduction Act in the U.S. – have been catalysts for financing and exploration for these minerals.

Figure 6 below presents exploration expenditures in Canada by commodity. We see a notable increase in the shares of "other metals," which includes lithium, cobalt, graphite, and REEs, as spending in this category is up nearly eight-fold between 2020 and 2023. Base metal exploration (including copper and nickel) and uranium are also up during this time period, primarily at the expense of gold.

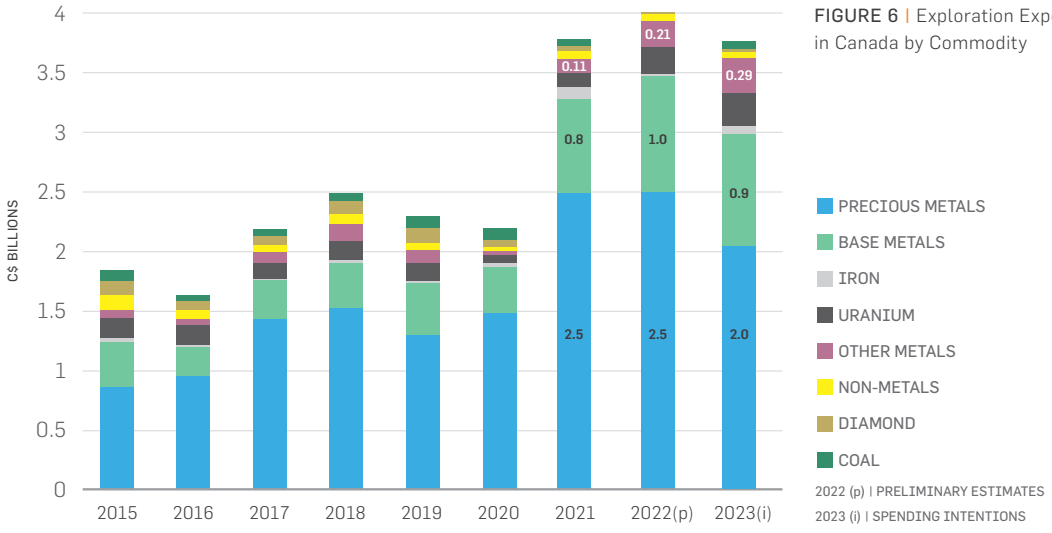


FIGURE 6 | Exploration Expenditures in Canada by Commodity

As figures have shown, 2022 was a pivotal year for the mineral sector, with opposing short and long-term forces at play.

While short-term economic uncertainties reduced the demand for raw materials and limited financing options for the sector, realization by governments and other stakeholders of the intrinsic link between metals and minerals – with the transition to low-carbon economy – has grown significantly.

With these dynamics setting the stage – along with geopolitical tensions heightening across different parts of the globe – a very strong long-term demand outlook for metals and minerals appears intact, even if tempered in the short-term by subsiding economic growth.

THIS MONTH IN HISTORY: THE NICKEL DEPOSIT THAT CHANGED CANADA

Mining in Canada has existed for what is estimated to be tens of thousands of years. Yet it was an accidental discovery 140 years ago in the Sudbury region that paved the way for Canada to become a global player in the mining industry.

A Brief History of Time

Approximately 1.85 billion years ago, after what is theorized to be result of a large comet impact, molten rock containing various ore deposits and minerals were compressed up from the Earth's crust into a ring-like formation called the "Sudbury Nickel Irruptive." Also known as the Sudbury Basin, this unique, ancient geological feature, was first mined an estimated 10,000 years ago by Indigenous populations.

Initially, quartzite that was extracted from the region and used for tools and weapons mainly for hunting big game. Then around 6,000 BC, the Indigenous people spread throughout North-Eastern Ontario – identified as the Northern Shield Culture – began to use copper found locally for household, hunting and ornamental purposes.

Following this, silver became mined with copper, and used for trade between Indigenous communities. This began the establishment of regular trade routes across Northern Ontario – thousands of years before the colonists from Europe arrived.

The Accidental Discovery

Just as the random impact of the comet almost two billion years ago produced the Sudbury Basin, the modern discovery of large nickel deposits in the region was also due to random chance.

In the late 1800's, the Canadian Pacific Railway (CPR) sent a surveying crew to establish a new route around Lost Lake (now known as Ramsey Lake), near the newly-founded railway town of Sudbury, Ontario. The lead CPR surveyor, William Ramsey, mistakenly marked the route to begin north of the lake, instead of running it as planned south, between Lost Lake and present-day Naughton, Ont. This mistake was fortuitous, however, as when CPR crews began clearing the area in August of 1883, a crew blacksmith named Thomas Flanagan noticed a unique grouping of rust-coloured rocks.

Believing that they may have found a previously-unknown copper deposit, Flanagan made note of

the area, and the site was marked for further exploration. The following year, 1884, the area was cut and graded, with samples taken and processed. Processing of the samples revealed Flanagan had indeed discovered copper – and nickel – and in 1885 the area was purchased and the Murray Mine began operations.

Primarily, the site was developed for copper production, and in 1901 the Canadian Copper Company also began mining by opening the Creighton Mine. At the time, ore from the mines was shipped to the Oxford Refinery in New Jersey, and it was by using advanced smelting techniques that the New Jersey processing facility was able to separate nickel from the copper in a purer form than had previously ever been done in North America. Thus, nickel mining in Canada began to boom.

At this time, New Caledonia – an island in the Pacific Ocean – was the world's leading source of nickel. But over the following decades, a refinery was established in Port Colborne, Ont. (off of what is now Nickel Street), and by the 1920's, nickel production expanded even further – with Canada becoming the world's largest supplier of this critical mineral.

This boom was fed by the demand for nickel and nickel-steel alloys used in military applications, and in subsequent decades for the growing manufacturing and transportation sectors.

Multifold Growth

Mining in Canada has contributed over $130 billion to the GDP in recent years. Arguably, that number may have been much lower if it wasn't for the accidental discovery of Ontario's nickel-rich Sudbury Basin - which saw an influx of the world's leading mining companies move into the area, who are still to this day producing nickel and other critical minerals from Sudbury – and across Canada – for the global market.

Currently, the Sudbury Basin is the second-largest supplier of nickel ore in the world, as well as a leading provider of critical minerals that are used to produce technologies for a low-carbon future. With the rising demand for low-carbon technologies, demand for nickel is anticipated to increase multi-fold in the next 30 years.

> “Currently, the Sudbury Basin is...a leading provider of critical minerals that are used to produce technologies for a low-carbon future.”

DIRECTORY

OFFICERS

Raymond Goldie
PRESIDENT

Karen Rees
FIRST VICE PRESIDENT

Scott Parsons
SECOND VICE PRESIDENT

Lisa McDonald
EXECUTIVE DIRECTOR

Maria Milanova
SECRETARY

James Lusby
TREASURER

BOARD OF DIRECTORS

Rosario Astuvilca-Rojas
INCLUSIVE MINING

Charles Beaudry
QC COPPER AND GOLD INC.

MaryAnn Crichton
SENIOR ADVISOR,
HATCH LTD.

Conrad Dix
AGNICO EAGLE MINES

Lana Eagle
LANA EAGLE CONSULTING

Sir Genik
BRIDGE©

Raymond Goldie
INDEPENDENT ANALYST
AND DIRECTOR

David Harquail
FRANCO-NEVADA CORPORATION

Doris Hiam-Galvez
HATCH LTD.

Mary Louise Hill
LAKEHEAD UNIVERSITY

Jessie Liu-Ernsting
G MINING VENTURES CORP.

Gordon Maxwell
CONSULTING GEOLOGIST

Stuart McCracken
TECK RESOURCES
LIMITED

David Murray
RESOURCEFUL
GEOSCIENCE SOLUTIONS

Ellie Owens
E2GOLD

Scott Parsons
ALAMOS GOLD INC.

Valerie Pascale

Karen Rees
CONSULTANT

Keith Spence
GLOBAL MINING CAPITAL

Rob Stevens
PAKAWAU
GEOMANAGEMENT INC.

Jeff Swinoga
EXPLOITS DISCOVERY CORP.

Ciara Talbot
LUNDIN MINING

Kerem Usenmez
LICAN EXPLORATION

Mary-Carmen Vera
SGS CANADA INC.

PROSPECTORS & DEVELOPERS ASSOCIATION OF CANADA

STAFF

Ariya Andrighetti
MANAGER, CONVENTION PROGRAMMING

Scott Barber
SENIOR MANAGER, COMMUNICATIONS

Gillian Blakey
COORDINATOR, CONVENTION EXHIBITS

Lynn Bodwell
CONVENTION MARKETING LEAD

Amy Buchanan
MANAGER, CONVENTION EXHIBITS

Curtis Byron
COORDINATOR, STUDENT & EARLY CAREER PROGRAM

Christy Clough
COORDINATOR, CONVENTION

Michael D'Amelio
COORDINATOR, CONVENTION PROGRAMMING

Sandra Doig
COORDINATOR, MEMBERSHIP, ADMINISTRATION & RECEPTION

Monika Hakala
COORDINATOR, CONVENTION SPONSORSHIP

Jahan Hussain
COORDINATOR, COMMUNICATIONS

Lynda Joyet
SENIOR MANAGER, CONVENTION EVENTS & SPONSORSHIP

Madina Kaytmazova
MANAGER, IT & ADMINISTRATION

Nicole Khun
ANALYST, SUSTAINABILITY

Jeff Killeen
DIRECTOR, POLICY & PROGRAMS

Amit Kumaria
MANAGER, BUSINESS DEVELOPMENT & STRATEGIC PARTNERSHIPS

Joan Marilyn Leslie
CHIEF ACCOUNTANT

Romika Leslie
DATABASE COORDINATOR

Florence MacLeod
MANAGER, MEMBER ENGAGEMENT & OUTREACH

Ran Maoz
ANALYST, TAX POLICY & CAPITAL MARKETS

Mark McCleary
COORDINATOR, MEMBER ENGAGEMENT

Lisa McDonald
EXECUTIVE DIRECTOR

Krishana Michaud
MANAGER, STUDENT & EARLY CAREER PROGRAM

Maria Avramova Milanova
DIRECTOR, OPERATIONS & HUMAN RESOURCES

Andrea Murdoch
EXECUTIVE ASSISTANT

Sarah Nazar (Maternity Leave)
MANAGER, CONVENTION PROGRAMMING

Marion Oliver
ANALYST, CRITICAL MINERALS, GEOSCIENCE & INNOVATION, HEALTH & SAFETY

Maureen Owens
COORDINATOR, CONVENTION PROGRAMMING

Jessica Provencher
COORDINATOR, CONVENTION EXHIBITS

Nicole Sampson
DIRECTOR, CONVENTION

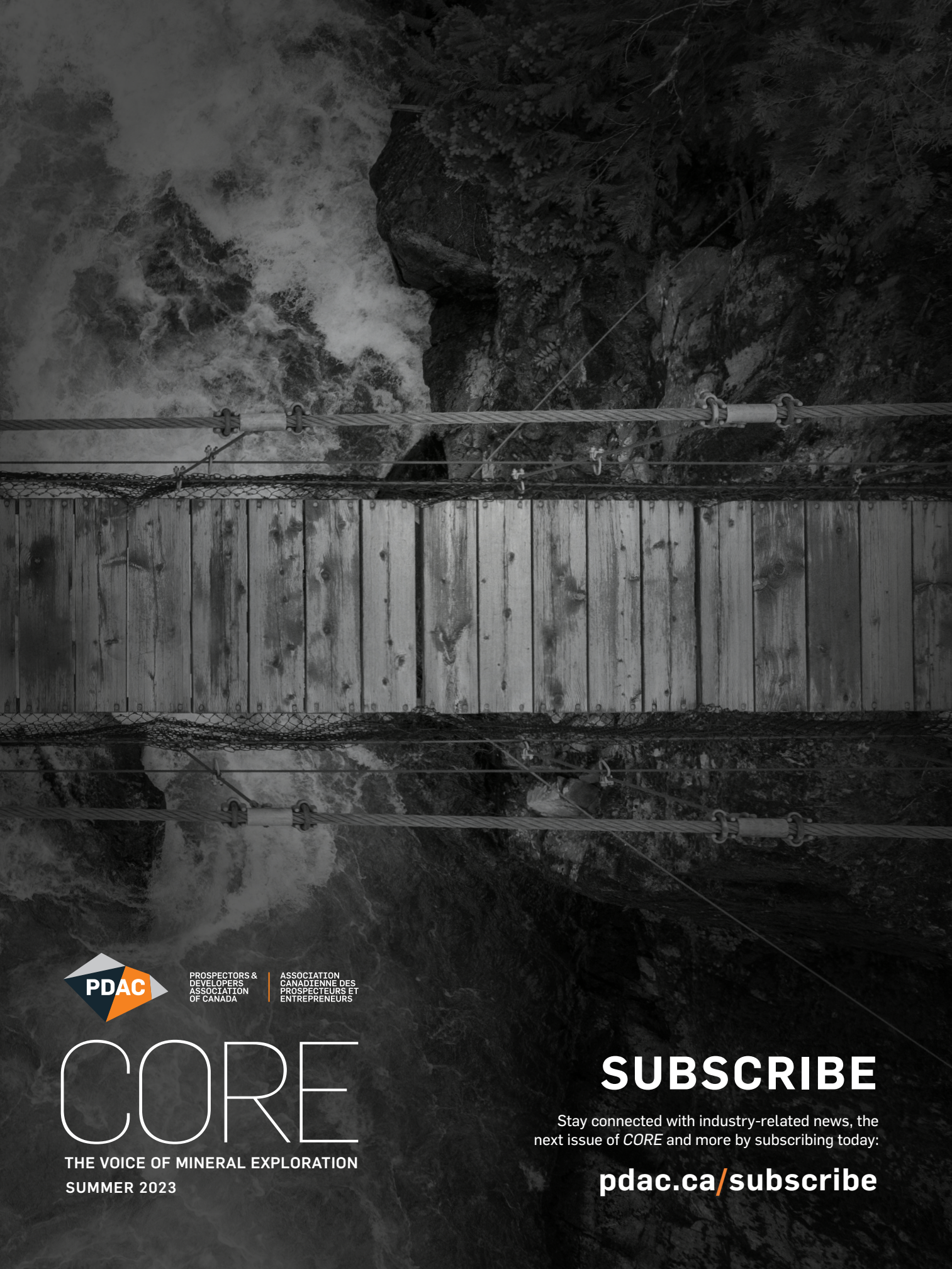
Steve Shapka
ANALYST, GOVERNMENT RELATIONS

Andy Stanleigh
PUBLICATIONS EDITOR & DESIGNER

Patricia Tucci
COORDINATOR, CONVENTION EVENTS & SPONSORSHIP

Petrona Tulloch
STAFF ACCOUNTANT

Stefanie Wolf
MANAGER, CONVENTION OPERATIONS



PDAC

PROSPECTORS & DEVELOPERS ASSOCIATION OF CANADA | ASSOCIATION CANADIENNE DES PROSPECTEURS ET ENTREPRENEURS

CORE

THE VOICE OF MINERAL EXPLORATION

SUMMER 2023

SUBSCRIBE

Stay connected with industry-related news, the next issue of *CORE* and more by subscribing today:

pdac.ca/subscribe